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# FORECASTING OF NATURAL RESOURCES USING ANN, M5TREE, ARIMA MODELS

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**Abstract -** *Natural Resource Prediction of the main constituent of living organisms, is crucial for economic and agricultural development particularly in arid areas where surface water resource are extremely scarce. Analysis and assessment of resources to collecting information often involve meteorological and hydrological components such as precipitation, flow, temperature etc. We are filtering this set of data (collected in the arid areas over a period of 3 months) using Artificial Neural Network (ANN) used for prediction , ARIMA model used for forecasting and M5 Tree method to create a module that would reach the estimated threshold value . A statistical study of these natural resources is new and can make a significant contribution to the theory and practice of the efficient use of natural resources. The project plays an important role in formation of new business technologies for enterprises operating in the natural resources sector. The identification of extraction trends for natural resources can positively affect the rational use of natural resources on the regional level.*

***Key Words***: Artificial Neural Network , Deep Learning , Arima Model, M5Tree model , Machine Learning , Prediction , Forecasting.

## 1.INTRODUCTION

Water is a natural resource which is the main constituent of living organisms and more than 97 percent of it is salt water. Groundwater is low cost, good water quality and sustained yield that is valuable for water supply during drought periods. It is also crucial for economic and agricultural development particularly in arid areas where surface water resources are extremely scarce. Groundwater is slow and difficult to recharge, if long term over extraction would cause groundwater depletion gradually, land subsidence and salt water intrusion. Therefore analysis and assessment of groundwater level can provide useful information for management of surface water and ground water. Multivariate modelling is an important issue because the planning, design, and operation of water resources systems often involve meteorological and hydrological (precipitation, flow, temperature, etc.) components. In recent years, the use of Artificial Intelligence techniques such as Genetic Programming (GP), Adaptive Neuro Fuzzy Inference System (ANFIS), Artificial Neural Networks (ANN) and M5tree (M5T) have been used to study groundwater levels. The study uses component analysis, correlation analysis and water balance method to explore the effect of amount of rain on groundwater level variation and recharge as well as Artificial Neural Networks (ANN) and ARIMA model is used to predict the groundwater level. The groundwater level measured in the previous years belonging to the Devanahalli region will be performed using Artificial Neural Networks (ANN), M5Tree (M5T) and ARIMA model methods. Monthly total rainfall and monthly average temperature data measured at the Meteorological Station and the static underground water level monthly measurement data.

## 2. METHODOLOGY

### 2.1 Artificial Neural Network

Artificial neural networks (ANN) one among the computing techniques and systems that able to derive new info through learning from the properties of the human brain, ability to form and see new info, developed with the aim of having the ability to perform with none facilitate.The foremost wide used methodology among the ANN strategies is that the feed- forward-back-propagation ANN approach, that operates in step with the principle of back propagation of errors. Associate in Nursing ANN model consists of input, hidden and output layers with their nodes. ANN Structure utilized in this study is given.

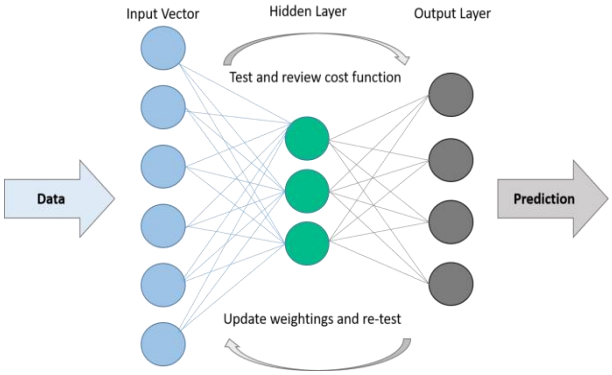


**Fig 1:** ANN

### 2.2 M5Tree

M5 approach was introduced by Quinlan (1992). M5 may be a system that makes tree-based and metameric linear models. This model involve classification that generate call trees. Model tree production takes place in these stages: the primary stage involves employing a partitioning criterion to make a choice tree. The partitioning criterion for the M5 tree approach algorithmic rule relies on the idea that the quality deviation of the values of a node accessing category may be a live of the error in this node then constructing a check for every attribute once computing the expected decrease during this error.The formula of standard deviation reduction ( ) given below:

$$sd(T) \quad {}_{T_T}{}^{|}sd(Ti)$$

where *sd* is symbolize of the standard deviation, T is a set of instances that gets at the node, Ti is the subset of instances that have the its outcome of the potential set (Wang, and Witten,1997).Finally potential tests are obtained, M5 selects the check that maximizes this expected "error reduction". Readers United Nations agency need to find out a lot of regarding the M5 model tree.

### 2.3 ARIMA Model

ARIMA is divided into three stages, The IDENTIFY, ESTIMATE, and FORECAST statements perform these three stages.

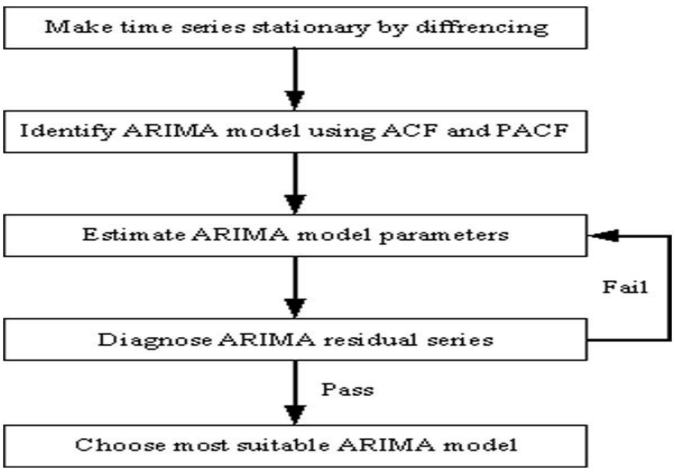


**Fig 2:** ARIMA Model

## 3. SYSTEM ANALYSIS

### 3.1 Existing System

The artificial neural networks (ANNs) were developed and applied to investigate the effects of these factors on ground water levels in the Minqin oasis, located in the lower reach of Shiyang River Basin, in Northwest China.The new aerostructural simulations of a generic 1.5 MW turbine are used to rank atmospheric influences on power output. Most significant is the hub height wind speed, followed by hub height turbulence intensity and then wind speed shear across the rotor disk. Its suited for only prediction of one resources. Prediction accuracy is less. It take more time to analysis of the data.

### 3.2 Proposed System

Natural Resources (groundwater, wind, minerals) level prediction using Artificial Neural Network, M5tree model and ARIMA model. Estimation of fluctuation of groundwater level(GWL) is very important in management of water resources. Similarly, estimation in the fluctuation of wind flow and mineral level present in the ground can be predicted using ANN, M5Tree and ARIMA model. It is cost effective. Accuracy of 96% in detecting of natural resources. Less time computation.

## 4. IMPLEMENTATION

### 4.1 Data Collection

The real-time data provided on the Internet are provisional and subject to change. The NWCC believes that the information is valuable but recommends that people be cautious when they use the data. The data is examined weekly and edited for obvious sensor problems. These edits are in the historical data files, which are also accessible via the Internet. Problems that require maintenance visits to a station are identified during the data examination, and the NWCC tries to schedule station visits based upon the identified problems.

### 4.2 Data Preprocessing

Data pre-processing is a data mining technique which is used to transform the raw data in a useful and efficient format.

### 4.3 Feature Extraction

Feature extraction is a process of dimensionality reduction by which an initial set of raw data is reduced to more manageable groups for processing. A characteristic of these large data sets is a large number of variables that require a lot of computing resources to process. Feature extraction is the name for methods that select and /or combine variables into features, effectively reducing the amount of data that must be processed, while still accurately and completely describing the original data set. In the given data set we will extract the important features to predict.

### 4.4 Forecasting And Prediction

We are using the M5 algorithm, ANN to predict the under water level, and wind power generation. we are using the ARIMA model to forecast the minerals in the area.

## 5 DATA FLOW DIAGRAM

### 5.1 Level 0

Level 0 describes the overall process of this project. we are passing dataset as a input the system will predict the available natural resources using M5, ANN and ARIMA algorithms.

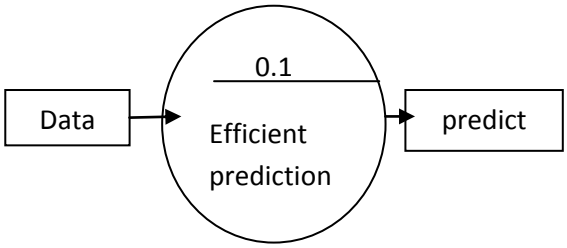


**Fig 3** : Level 0

### 5.2 Level 1

Level1 describes the first stage process of this project. we are dataset as a input the system will preprocess and extract the important features.

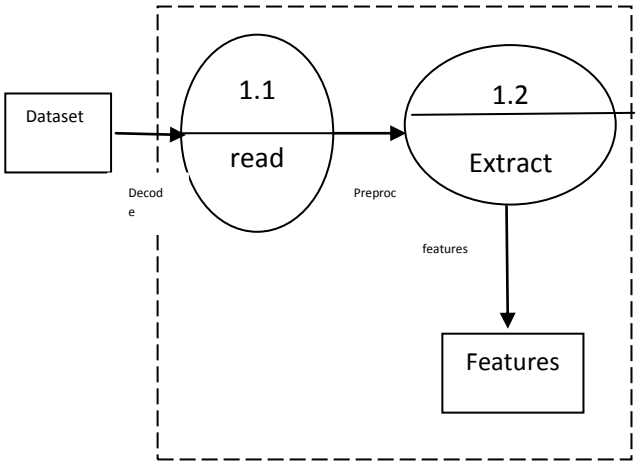


**Fig 4**: Level 1

### 5.3 Level 2

Level 2 describes the final stage process of this project. we are passing extracted features from level 1and trained data as a input the system will predict the natural resources using ANN.

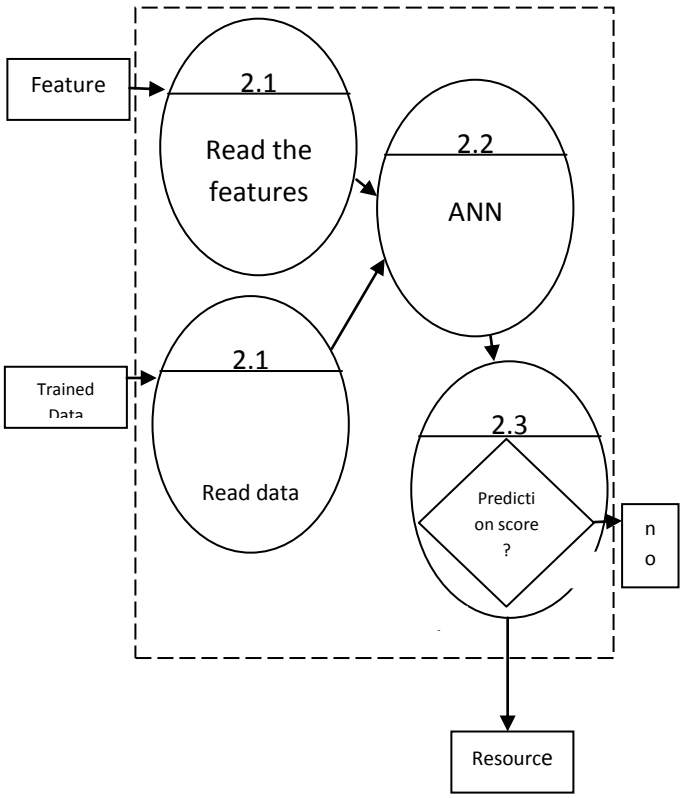


**Fig 5:** Level 2

## 6. CONCLUSION

The main motive of this project is to forecast natural resources this is achieved by implementing the hybrid model to predict the various types (ground water level ,windmill prediction and minerals) of natural resources using machine learning algorithms such as ANN,M5 Tree and ARIMA Model.

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